The results of quinoa trials achieved in all the countries have been encouraging. Since there were wide variations in the climatic/agro-ecological conditions in all the participating countries, hence, as a result of genotype X environment interaction, various quinoa cultivars responded differently to typical local conditions. Large variations in grain size, colour, maturity and grain yield per hectare were observed across locations within and between countries. These variations in various important traits of economic importance helped countries in selection of early, medium or late maturing quinoa cultivars suited to typical climatic/agro-ecological conditions.

Comparison of varieties across the countries/locations revealed very interesting and consistent patterns of performance that resulted in the identification of several potential varieties such as Titicaca, Q12, Q26, Q27, Amarilla, Sacaca and Kancolla. These varieties/genotypes exhibited adaptation and suitability to the local climatic conditions in all the countries. The highest yield of 7.500 tons/ha was recorded in Lebanon closely followed by Egypt 3.872 tons/ha, while lowest yield was recorded in Mauritania 0.230 tons/ha. The countries have already multiplied seeds of suitable cultivars for further evaluations and scaling up purposes both at research centers as well as at farmers' fields. Initial FAO variety evaluation and adaptation studies have indicated that quinoa productivity could be sustainable in all the project participating countries.

Based on the results achieved, it could be suggested that quinoa could be one of the allies in reducing malnutrition and food security problems in the region. Since quinoa is a new food crop, still it has to find a place in the prevalent cropping patterns, farming systems, local diets and markets in most of the countries involved in quinoa evaluation and production. Quinoa in the lowland areas is planted in October-November competing with wheat/barley while in mountainous areas is cultivated in April/May, hence, competing with offseason vegetables production. Therefore, to be successful in the region, it has to prove its worth in the marginal areas with millions of hectares of land affected by salinity and alkalinity where the majority of the food crops could not be produced economically. FAO RNE has also launched a new initiative to scale up quinoa production in marginal environments. The program includes further screening and testing of climate-resilient, salt/heat tolerant, water-use efficient, and high yielding varieties in new marginal locations in five countries; creating marketing strategies and implementing actions to boost quinoa demand.

However, the marketing of quinoa appeared to be quite developed in some countries. Two out of 8 countries imported quinoa for various food products. Lebanon imported in 2014 around 100 MT, while Egypt's import did not exceed 15 MT. It is encouraging to learn that quinoa has moved from research institutes to the farmers' fields. In Egypt, during 2014, a private agricultural company has already started planting quinoa with the technical support of Egyptian Quinoa team. In Iran two farmers have also initiated quinoa production on commercial basis during 2015.

A new face of quinoa production: challenges for the Andean region

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Quinoa, a seed crop originated in the Andean region with a remarkable nutritional value, has been recognized internationally as an ally for food security. During the last century the dynamics of interest and research have moved quinoa to different areas of the globe delineating a new distribution map in which the scale of development denotes new challenges for the traditionally producing countries. We analyze the Andean context of quinoa production from global and regional scales with more emphasis for Peru, Bolivia and Ecuador. With different databases from the 1900s up to 2016, this analysis holds the most updated information for the region and illustrates the new settings producers have to face. The analysis shows quinoa has spread across the globe and adapts to produce in other regions. In 2016, quinoa is present in 101 countries for research and production. Two big (more than 5000 ha) and four medium (up to 5000 ha)

scale producers are now outside the Andean region and the latter are developed countries with high agricultural technology. Even when 79% of global exports are supplied by Peru and Bolivia, yields strongly fluctuate along decades between 0.4 – 1.1 t ha-1. In only two years the production area in both countries doubled and increased ten times in Ecuador causing uncertainty for sustainability. In 30 years, quinoa from Andean countries gained a space in the global markets and improved farmers' livelihoods. Nevertheless, at the end of 2015 producer prices collapsed for a big producer such as Bolivia. The process evolved and farmers confront a different scenario with new competitors and concerns. Being conscious of the new reality is essential to face challenges with responsibility. Analyzing at different scales is necessary, as encouraging local biodiversity and cooperating towards inclusive processes that benefit all.

Keywords: Quinoa production systems, quinoa market, agrobiodiversity, sustainability, policy research

Experimenting with quinoa: the Indian experience

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Quinoa (*Chenopodium quinoa* Willd.) is an allotetraploid (2n= 36) annual, self-fertile crop which is one of the 250 species included in the genus Chenopodium (Amaranthaceae). Quinoa has generated increased interest among farmers, researchers and policy makers across the globe which necessitates its introduction outside the Andean region. The crop has been introduced across continents and the results have been quite encouraging. Keeping in view the tremendous scope of this crop, research on quinoa started in India in the 1990s and was later extended into an extensive breeding programme. The main objective was to assess the scope of this species as a 'new crop' in India along with the aim of genetic improvement and development of high-yielding varieties suited to Indian conditions. Trials in the Indo-Gangetic Plains have shown that the crop can be successfully cultivated in this region with many cultivars giving grain yield as high as 9.83 t/ha. Quinoa has adapted well to Indian conditions with several accessions showing good adaptability and appreciable grain yield. The crop has also been successfully cultivated in peninsular India and is currently being explored as a viable alternative in the arid lands of Bundelkhand in region of Uttar Pradesh under the Diversified Agriculture Support Project (DASP). A multipronged strategy with the participatory approach at the core needs to be followed for promoting this crop among the rural masses in the Indian subcontinent. Given the recent spurt in the prices of pulses, quinoa can be an important component in combating 'silent hunger' prevalent among large populations of India who have little access to a protein rich diet. The crop is poised to play a major role in the future diversification of agricultural systems in India, not only in the temperate Himalayan region, but also in the North-Indian Plains and peninsular India.

Keywords: Quinoa, India, underutilized crop, nutritional security, participatory approach